SURVEYS FOR BEACHED MARINE MAMMAL AND SEABIRD CARCASSES
Annual Progress Report

December 27, 2001

Redwood National and State Parks (RNSP)
Greg Holm, Wildlife Biologist

INTRODUCTION

Beached carcass surveys are performed to ascertain baseline information about seabird and marine mammal mortality that occurs along the Redwood National and State Parks (RNSP) coastline. The main objectives of the surveys are to gather trend data on mortalities, and determine whether the mortalities resulted from natural or anthropogenic events. Documenting natural mortalities can help biologists monitor events such as the expected deaths of post-fledging and adult seabirds, fatal injuries from predation and other natural hazards, and diseases in a population. Also, the effects of natural events (e.g. El Nino) on a population could be monitored more effectively. The north coast of California receives traffic from container vessels carrying petroleum products, and while these ships are not visible from the coastline, they are a constant presence. Consequently,

the cumulative impact of any small, unpublicized leaks, spills, or accidents could contribute directly to seabird and marine mammal mortality. The presence of petroleum products on carcasses can provide information on "background" levels of these contaminants in the marine system. In addition, baseline data on the presence of petroleum products on wildlife can be valuable for comparison when a large scale spill occurs. Entanglement in fishing gear and human trash, such as plastic bags and six-pack rings, has been documented as a cause of death for marine fauna, and is monitored for frequency of occurrence within RNSP.

METHODS

The first surveys to monitor seabird and marine mammal mortalities were performed by RNSP staff during 1997. These surveys continued during 1998 and 1999, with 2 surveys typically performed in the winter (December, January) and 3 surveys performed in the summer (May, June, July). These surveys were typically done in conjunction with ongoing western snowy plover (*Charadrius alexandrinus nivosus*) surveys, since they took place in the same locations. Surveyors would walk one direction in the back-beach dune areas surveying for snowy plovers, and then return along the rack line of the beach looking for any marine mammal or seabird carcasses. There have been 7 beach stretches surveyed within RNSP for carcasses, from south to north: Freshwater Spit, Mussel Beach, Gold Bluffs Beach (south and north), Carruther's Cove, Klamath Spit (north and/or south portion), and Crescent Beach (Appendix A).

Beginning in 2000, the beached marine mammal and seabird carcass surveys were expanded in an attempt to include all months of the year. Winter surveys (January, February, November, and December of the same calendar year) were only conducted on Gold Bluffs Beach and Freshwater Spit, whereas surveys from March-October were conducted on all 7 of the beach stretches. Beach stretches were surveyed in accordance with RNSP beached carcass survey protocol (Appendix B), and all data was collected on beached carcass data sheets (Appendix C) and entered into the Fish and Wildlife Branch database. Fish and Wildlife staff that participated in 2001 surveys were; Cara Arguello, Keith Bensen, Jesse Conklin, Terry Hines, Baker Holden, Greg Holm, Frank Kemp, Ben Littlefield, Kyle Max, Jeanne Mayer, and Kristin Schmidt.

RESULTS

2001 Winter Surveys

Freshwater Spit, Gold Bluffs Beach, and Carruther's Cove were all surveyed for beached carcasses during January, February, November, and December, 2001. Surveyors spent a total of 24 hours (39 person hours; Figure 1) looking for beached carcasses during the winter surveys, and covered approximately 20 km (12.5 mi.) of beach during each monthly winter survey. Sixty carcasses were detected during winter surveys (Figure 2). Approximately the same number of carcasses were detected in January-February as in November-December, with 80% detected on Gold Bluffs and Carruther's Cove beaches. An average of 2.5 carcasses were detected per hour of survey effort (Figure 3).

2001 Non-winter Surveys

All Redwood National and State Parks beaches were surveyed for beached carcasses during March through October 2001. Freshwater Spit, Mussel Beach, Gold Bluffs Beach (north, south, and Carruther's Cove section), Klamath Spit, and Crescent Beach were all surveyed once during each of these months. Surveyors spent a total of 115 hours (240 person hours; Figure 1) looking for beached carcasses during these surveys, and covered 29.7 km (18.4 mi.) of beach during each monthly survey. Five hundred and ninety two carcasses were detected (Figure 2). Seventy-eight percent of the carcasses were detected during August through October, with the peak carcass count occurring in September (n= 207). Sixty-six percent of all carcasses were detected on Gold Bluffs beach (n= 396), and 15% were detected on Crescent Beach. An average of 5.1 carcasses were detected per hour of survey effort (Figure 3).

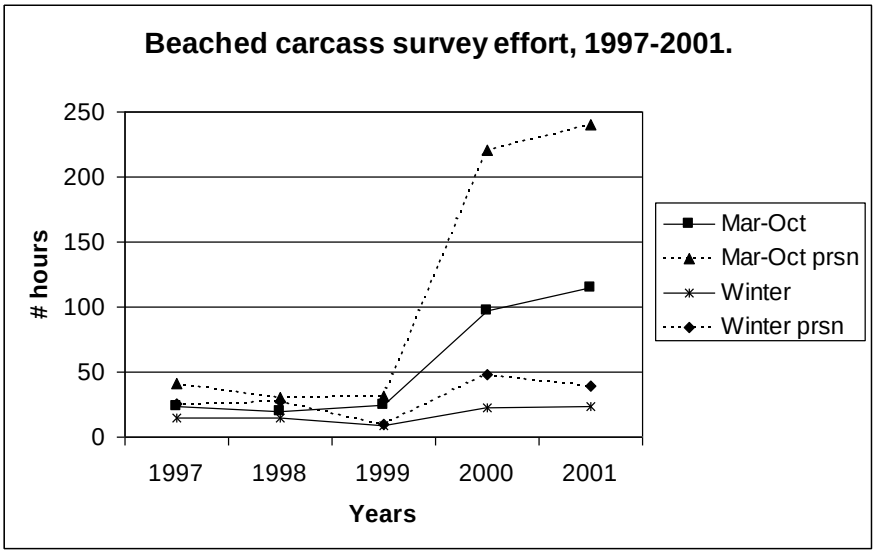


Figure 1. Beached carcass survey effort (hours and person hours) along RNSP beaches, 1997-2001.

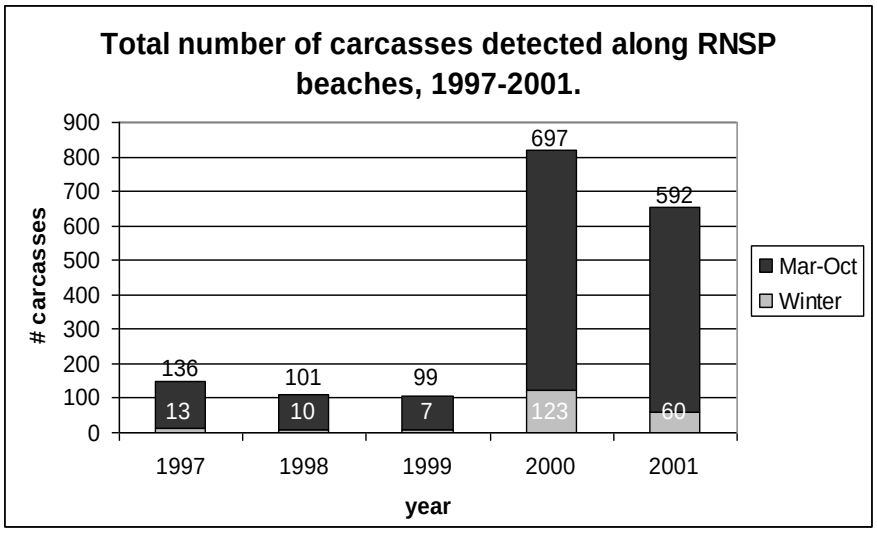


Figure 2. Total number of carcasses detected along RNSP beaches, winter and Mar.-Oct., 1997-2000.

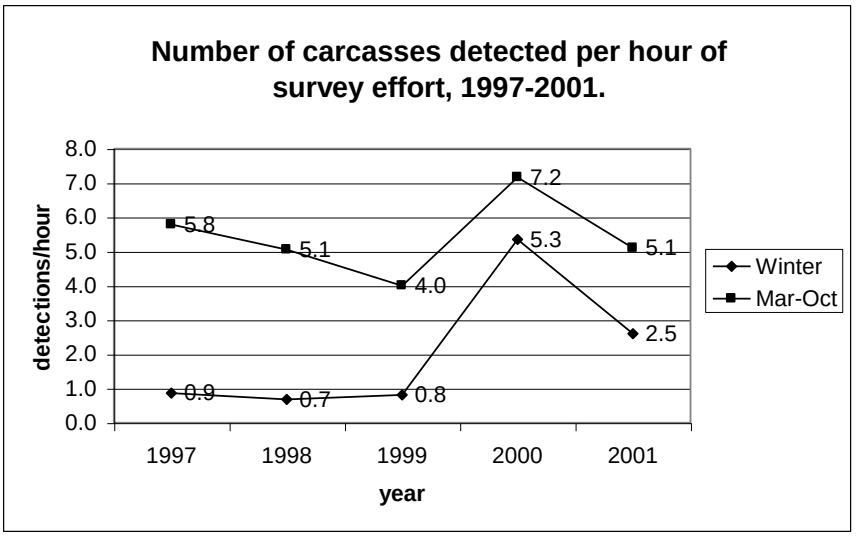


Figure 3. Number of beached carcasses detected per hour of survey effort, 1997-2000.

Seabirds Detected

There were 563 identifiable bird carcasses detected during 2001. The most common species detected were common murres (*Uria aalge*) with 214 detections. There were also 55 birds that were categorized within the family Alcidae, but could not be identified to species. The second most common group of carcasses found were gull species, with 216 detections. A large majority of the gull carcasses were not identifiable to species. The next 3 most common bird groups detected were cormorants (n=19; 3 species), brown pelicans (n=19; *Pelecanus occidentalis*), and sea duck species (n=12; >1 species). There were 8 sooty shearwaters, 6 northern fulmars, and 9 other groups/species of birds were detected in small numbers (Table 1). Thirty-six bird carcasses could not be reliably identified to a group or species.

Group/Species	#	Group/Species	#
Pigeon Guillemot	3	Egret (unknown species)	1
Common Loon	2	Western Sandpiper	1
Common Raven	2	Parasitic Jaeger	1
Belted Kingfisher	1	Turkey Vulture	1
Killdeer	1	----------	--

Table 1. Beached bird groups/species carcasses detected in small numbers along RNSP beaches during 2001.

Marine Mammals Detected

There were no whale carcasses beached on the RNSP coastline during 2001. There were 8 California sea lions (*Zalophus californianus*), 2 Stellar's sea lions (*Eumatopias jubata*) and 10 harbor seals *(Phoca vitulina*) beached on the RNSP coastline during 2001. There were also 3 carcasses identified as being sea lions, but species was

unknown, and 3 identifications of bone piles being from either a seal or sea lion. Twelve of the seals and sea lions were beached along Gold Bluffs beach and Carruther's Cove, and 7 were beached on the Klamath Spit. All seals and sea lions were detected between March and December.

Other Species

Other mammals detected during surveys included 1 elk (*Cervus elaphus rooseveltii*) and 2 unknown/unidentifiable mammal species. There were 7 skates detected, including 3 identifies as big skates (*Raja binoculata*), and 2 sharks, with one identified as a salmon shark *(Lamma ditropis*). We also detected 1 chinook salmon *(Oncorhynchus tshawytscha*).

CONCLUSION

There was a 20% reduction in the total number of carcasses detected during 2001, when compared to 2000 totals. There were significantly fewer carcasses detected during the winter months of 2001 (52% reduction), and the detection rate per hour of survey time decreased during both time periods when compared to 2000. However, the peak period when most of the carcasses appear on RNSP beaches once again occurred from August through October, with 78% and 80% of carcasses detected during this time period in 2001 and 2000 respectively. While a large number of carcasses were detected during this time period, it is not known how often the same carcass were counted during subsequent surveys. Therefore, the number of carcasses presented in this report likely includes some degree of replication.

The large number of common murres and alcids that were detected are likely a reflection of the large number of these birds that occur off the coastline of RNSP, with estimates of breeding common murres on False Klamath Rock approaching 20,000. There are also a large number of different gull species that reside along RNSP beaches, again reflected in the large number of dead gulls that were detected in 2001. Cause of death was undetermined for almost all seabird carcasses found, yet almost all carcasses had the appearance of death from natural causes. There were no obvious deaths from such things as entanglement in fishing gear and human trash, plastic bags and six-pack rings. There was only 1 carcass (Common Loon) with any detectable amount of petroleum products on it, and it was collected for further analysis.

There were no whales beached along RNSP coastline during 2001. Typically, RNSP has 1-2 whales beach during the year, with 2000 being a peak year with 5. There were 26 dead seals and sea lions (combined) that washed up on RNSP beaches during 2001. This was a real increase (27%) over the number detected in 2000, as seal and sea lion carcasses were not double-counted.

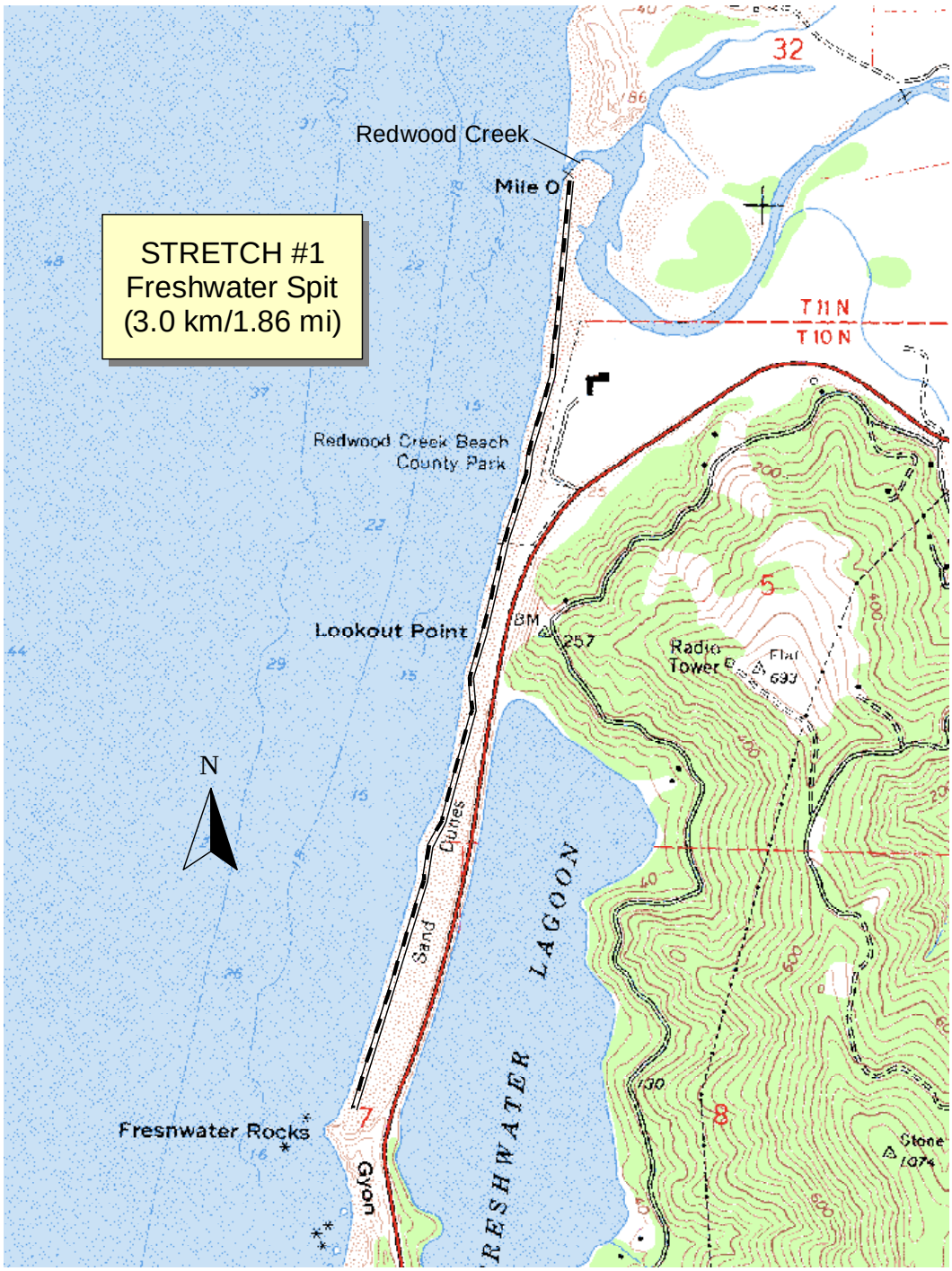
RECOMMENDATIONS

Because human caused mortality and other non-lethal impacts can occur at any time during the year, surveys for beached carcasses need to be conducted at regular intervals throughout the entire year. Spacing surveys by approximately 4 weeks likely

allowed us to detect trends, yet reduced double counting of carcasses significantly. Future surveys also should incorporate a method to mark carcasses that have been detected, so that they are less likely to be double-counted during subsequent surveys. Short-term trends are probably insignificant, and only after many years of data collection will any natural patterns become evident. Mortality based on man-made events will be more immediate and causative.

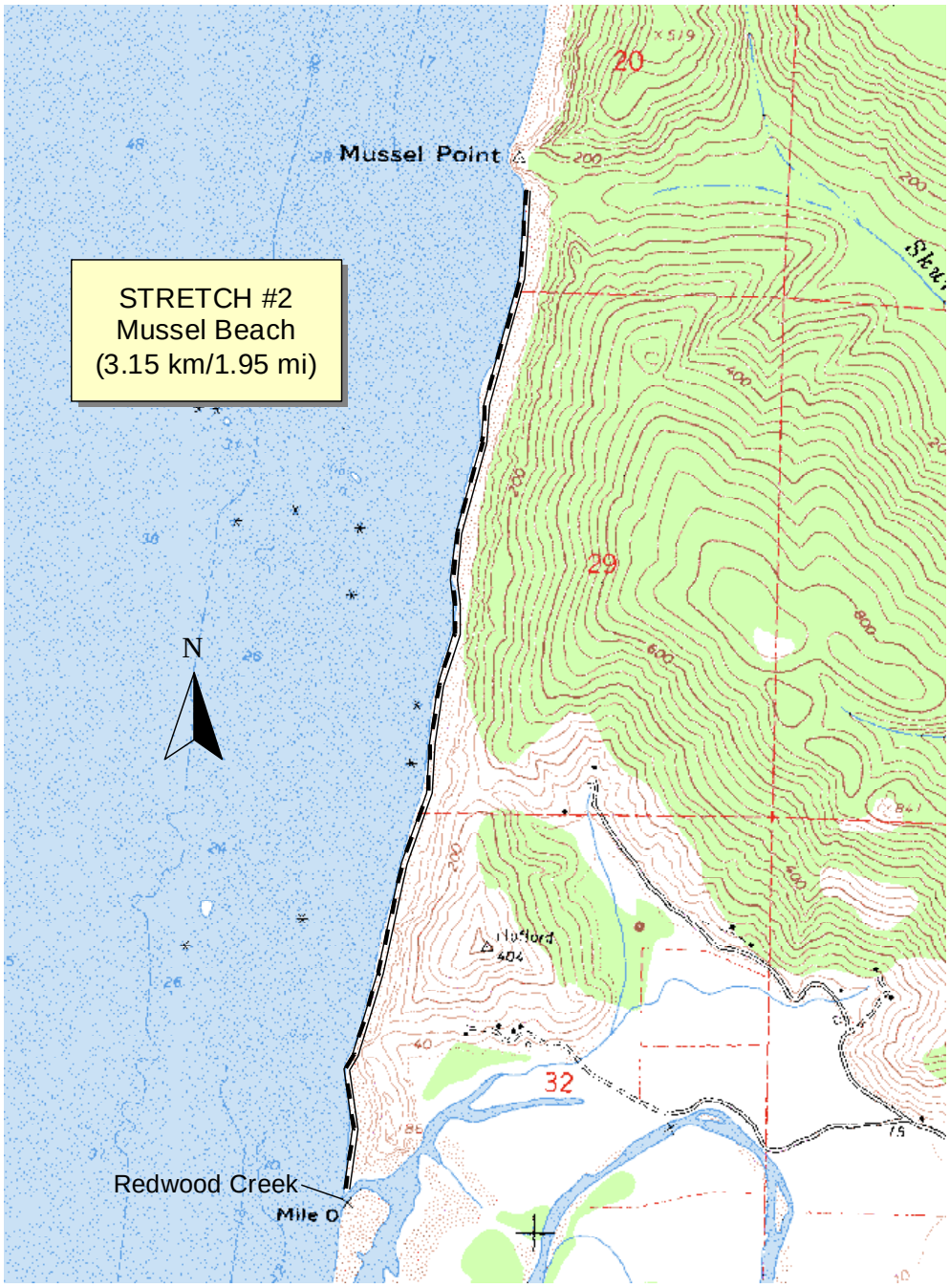
Appendix A. RNSP beach stretches surveyed for beached marine mammals and seabirds, 2001.

Reach #1, Freshwater Spit. Start at the south end of Freshwater Spit (north of Gyon Bluffs) and proceed north to the mouth of Redwood Creek. One-way distance is approximately 3 km (1.9 mi.), and estimated survey time is 1 hour. Two surveyors are preferred, but one is sufficient if a zig-zig course is used for the wider portions, or survey is performed in both directions.



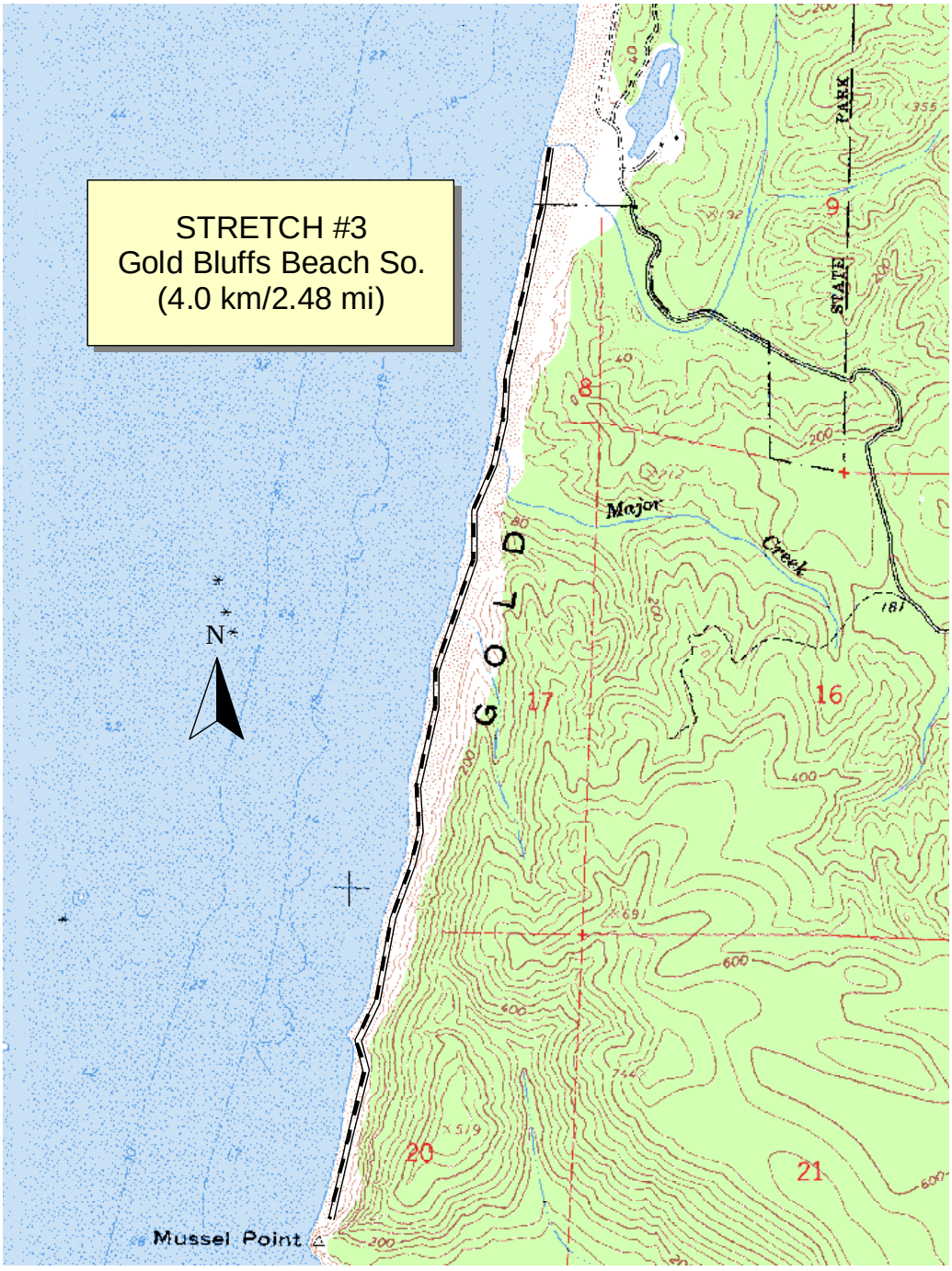
Appendix A. (cont.)

Reach #2, Mussel Beach. Start at the north end of the mouth of Redwood Creek and proceed north to Mussel Point. One-way distance is approximately 3.2 km (2 mi.), and estimated survey time is 1½ hours. Two surveyors are preferred for this stretch, but one surveyor is sufficient if a zig-zig course is used for the wider portions, or the survey is performed in both directions.



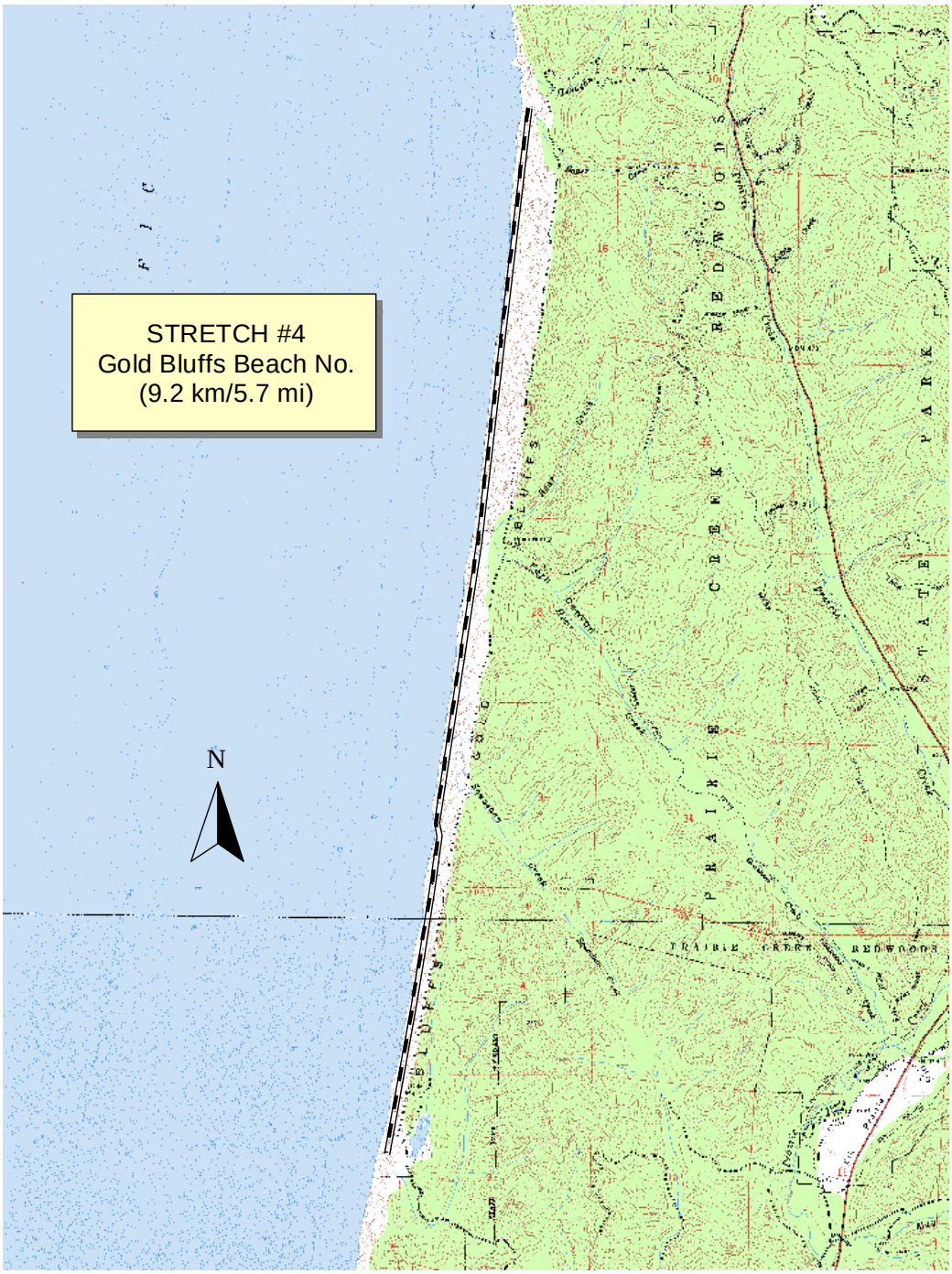
Appendix A. (cont.)

Reach #3, South Gold Bluffs Beach. Start at the south end of the small creek draining from Espa Lagoon and proceed south to Mussel Point. One-way distance is approximately 4 km (2.5 mi.), and estimated survey time is 2 hours. Two surveyors are preferred, but one is sufficient if a zig-zig course is used for the wider portions, or the survey is performed in both directions.



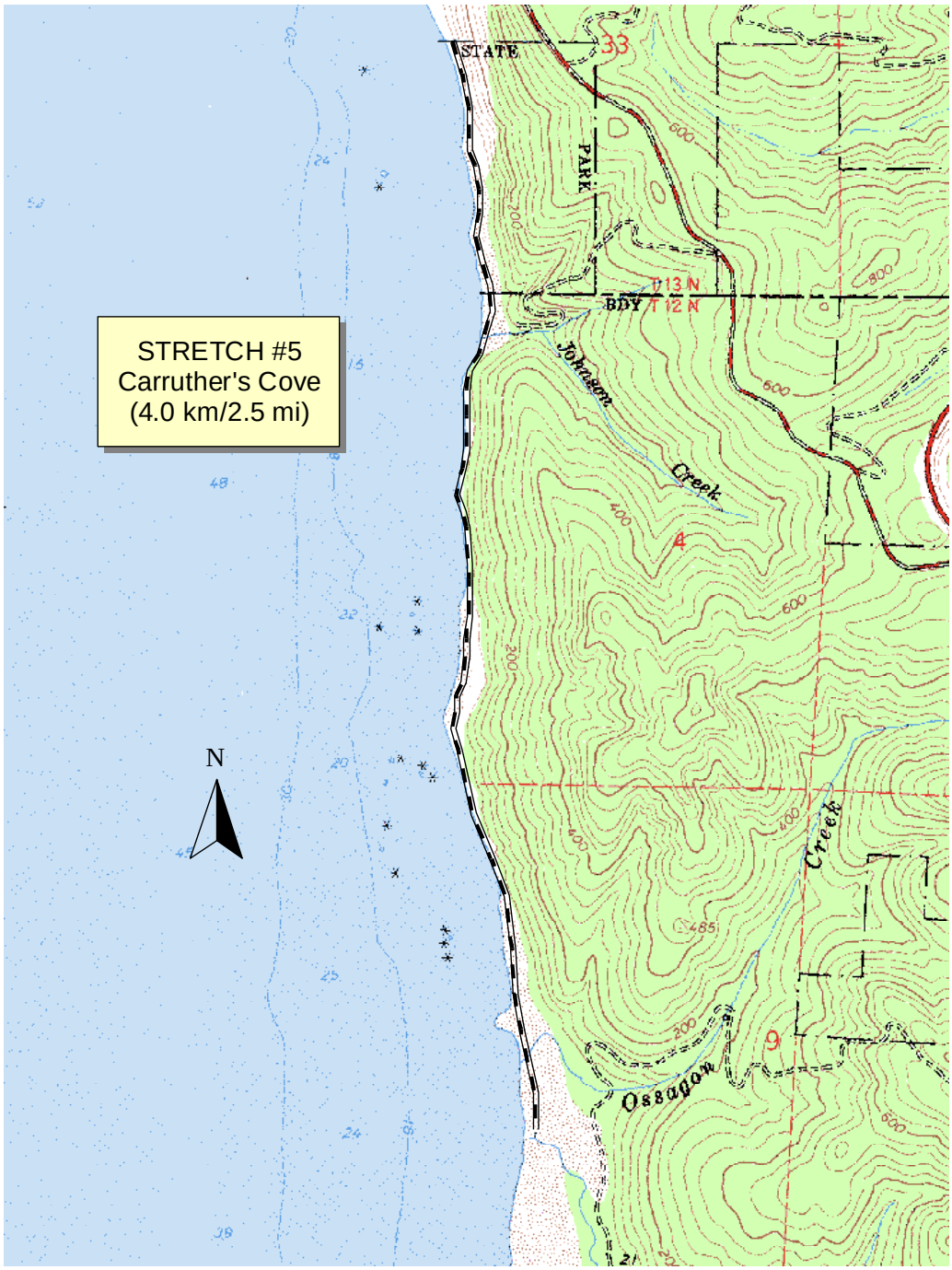
Appendix A. (cont.)

Reach #4, North Gold Bluffs Beach. Start at the north end of the small creek draining from Espa Lagoon and proceed north to Ossagon Rocks. One-way distance is approximately 9.2 km (5.7 mi.), and estimated survey time is 4 hours. Three surveyors preferred, but two are sufficient if a zig-zig course is used for wide portions, or the survey is performed in both directions.



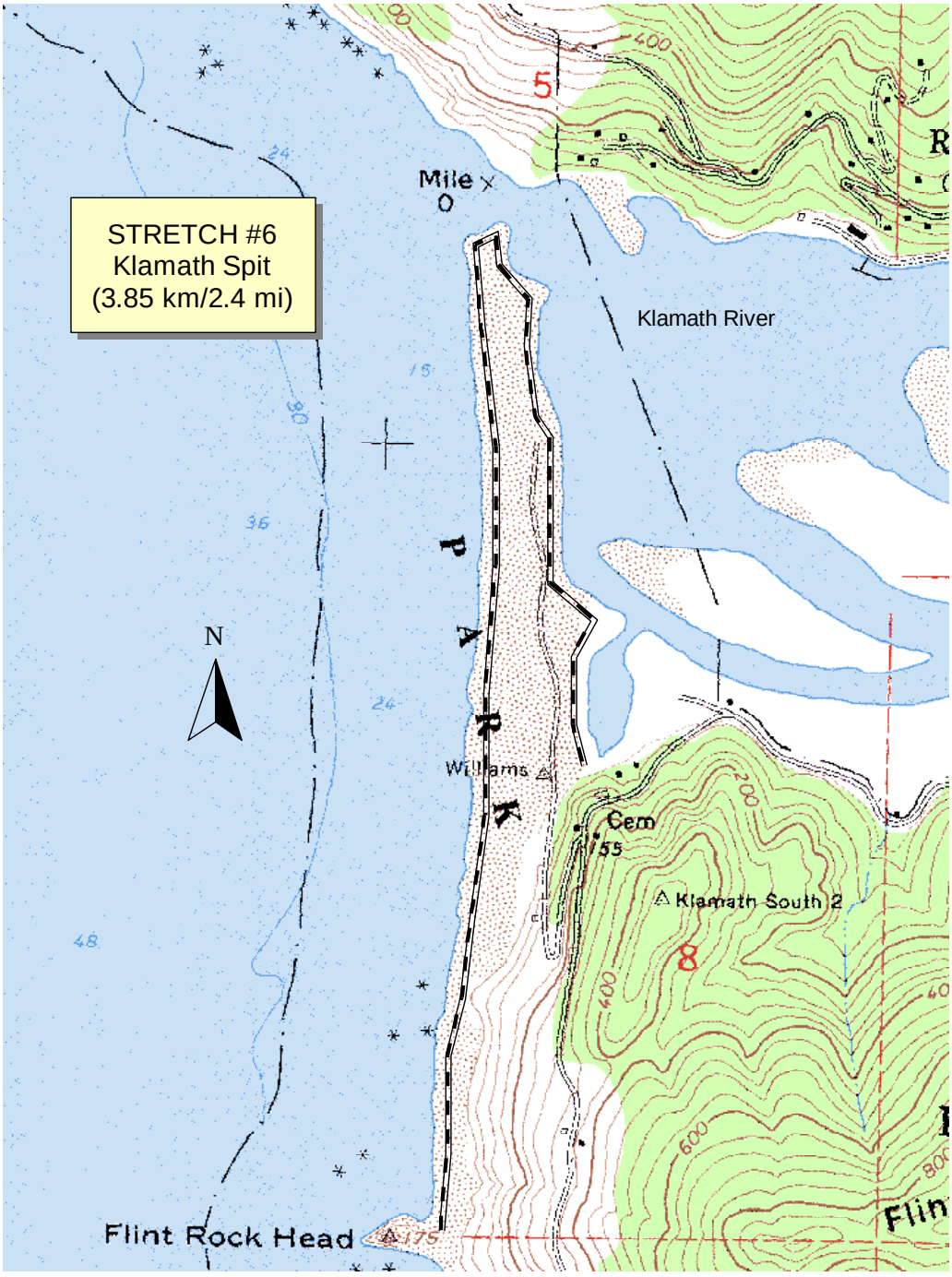
Appendix A. (cont.)

Reach #5, Carruther's Cove. Access this stretch from Carruther's Cove trail at south end of Coastal Drive. At the point where the trail hits the beach, proceed north surveying wide back beach area until beach ends, then turn south and survey until Ossagon Rocks. One-way distance is approximately 4 km (2.5 mi.), and estimated survey time is 2 hours. Two surveyors preferred, but one is sufficient if a zig-zig course is used for wider portions, or the survey is performed in both directions.



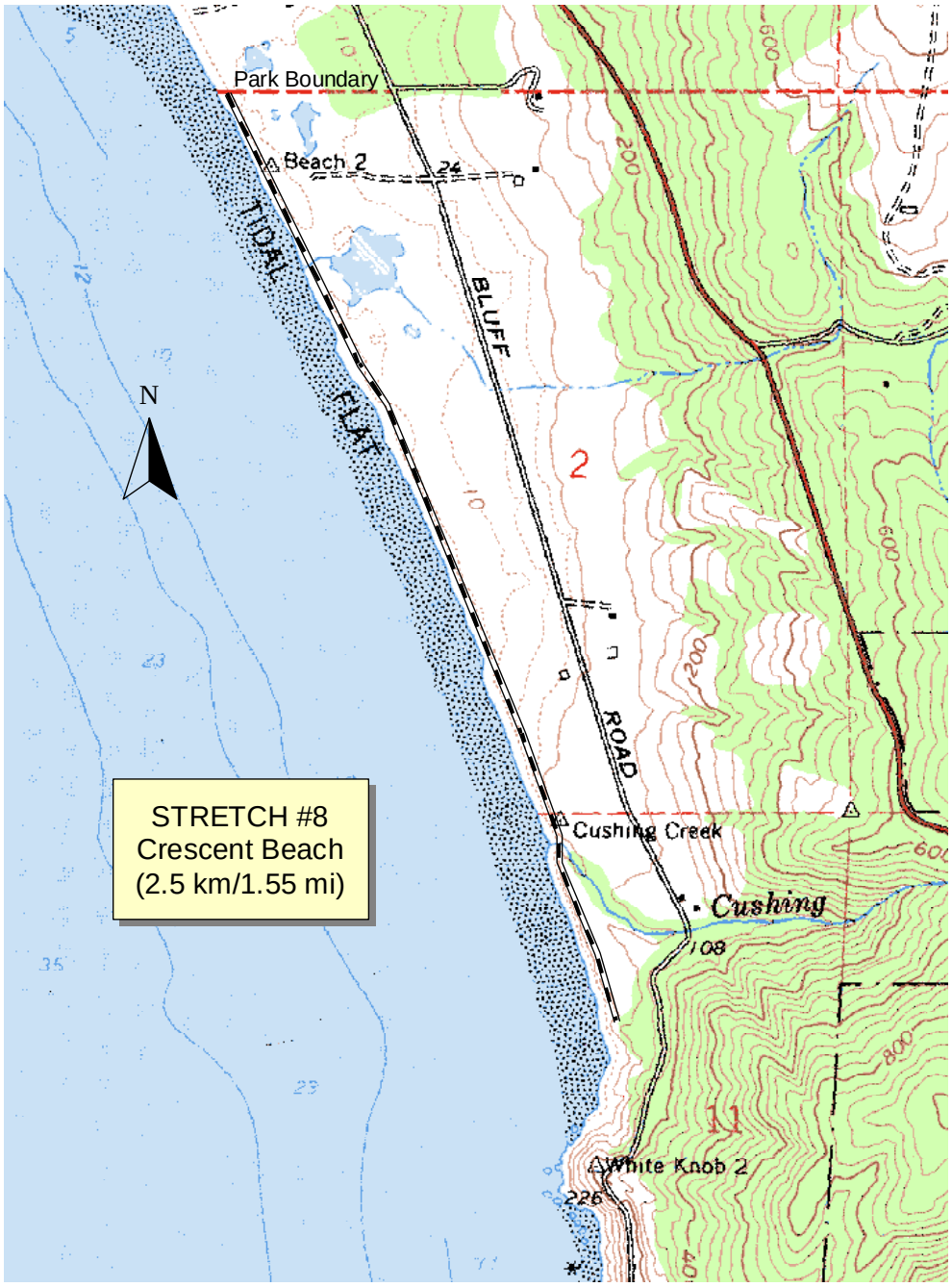
Appendix A. (cont.)

Reach #6, Klamath Spit (south end). Accessed from Coastal Drive, through the Brush Dance site. Trail starts at west side of the site and proceeds to beach. At the point where the trail hits the beach, head north along east side of spit to mouth of the Klamath River, then south along ocean side of spit. One-way distance is approximately 3.9 km (2.4 mi.), and estimated survey time is 2 hours. Two surveyors preferred, but one is sufficient if a zig-zig course is used for



Appendix A. (cont.)

Reach #8, Crescent Beach. Access from the Crescent Beach Picnic Area. Survey from approximately 200 yards north of the picnic area (park boundary) to area directly below White Knob (Crescent Beach Overlook). One-way distance is approximately 2.5 km (1.6 mi.), and estimated survey time is 1½hours. Two surveyors preferred, but one is sufficient if a zig-zig course is used for wider portions, or the survey is performed in both directions.



Appendix B. RNSP beached carcass survey protocol.

BEACH CARCASS SURVEY PROTOCOL (revised December, 2000)

Beach carcass surveys are performed to ascertain a baseline of seabird and marine mammal mortality that may be occurring along the RNSP coastline. Direct mortalities from natural and anthropogenic events can be determined. The affects of natural events, such as El Nino, which might cause starvation due to the collapse of the prey base or epizootic diseases, could be monitored instead of going undetected. The effects of El Nino was documented in Oregon where Common murres were washed up on beaches at eight times the normal rate (Meehan, 1997). This documentation was made possible through established beach carcass surveys.

The presence of petroleum products on carcasses can provide information on background levels of these contaminants in the system. This information would be useful in the event of a large scale spill involving oil or fuels, e.g. to compare what resulted from a large spill to what may already be occurring in small amounts. The north coast of California receives heavy traffic from container vessels carrying petroleum products, and while these ships are not visible from the coastline, but are a constant presence. Consequently, small accidents may take place, such as ballast leaks, that could leak low levels of oil into the system. The cumulative impacts of many small, unpublicized accidents during the year could contribute indirectly to seabird mortality. In addition, entanglement in fishing gear and human trash such as plastic bags and six-pack rings have been documented as a cause of death for marine fauna. Other natural mortality occurring may be due to the expected deaths of post-fledging seabirds, old age, and predation.

Species may also be found well away from their natural ranges (such as sea turtles) that could provide information on unusual migrations or even range extensions. Data such as this, as well as how the animals died (if it can be determined) can be added to data collected from other areas to provide a tool in analyzing long-term trends. Point Reyes National Seashore acts as a repository for carcass data collected in California. RNSP did not carry out any systematic carcass surveys until 1997, so baseline information on natural (and unnatural) sources of mortality are lacking prior to 1997. Carcass surveys were first initiated in 1997 in conjunction with snowy plover inventories.

Even with the best available data, surveyors can not know the exact proportion of birds killed at sea that are detected on carcass surveys, as extrapolations from carcass counts to estimate total mortality are not realistic (Piatt, et al, 1991). The authors also note that in other regions of the globe (western Europe and eastern Canada), mean oiling rates from carcass surveys approach 50-90% of the total carcasses collected; other areas generally approach means of less than 20%. Also, it is often difficult to determine if some carcasses persist in the beach environment for longer that 1 survey period, leading to over estimates of mortalities.

METHODS

Beach carcass surveys can be performed by one or multiple surveyors (see Appendix A for beach stretches and number of surveyors recommended for each stretch).

The importance of systematic surveys can not be overemphasized, e.g. surveying the same stretch of beach at regular intervals to establish patterns of mortality (Ainley, et al, 1994). Binoculars are recommended, as they can help an observer on wider reaches determine if a suspicious object bears closer inspection. To the extent possible, surveyors should record the presence of other species observed while performing the surveys.

Observers should concentrate more on the wetted sand portion of the beach for the carcass surveys, along the rack line (where marine debris piles up). However, observers should be aware that carcasses do wash up quite high on the beach, and many have been found above the evident boundary between wet and dry sand (at the highest previous high tide). Proceed along the beach, and record carcasses with as much detail as possible on the carcass survey form (attached). Surveyors should have a copy of the NOAA Guide to Beached Marine Birds and Mammals (Ainley, et al, 1994) to aid in identification, since most of the carcasses are scavenged or dehydrated. The guide should be used with caution, however, as the keys to feet and bills are hand-drawn. Many carcasses will still be difficult to identify to species; some will show similarity between 2 or 3 closely related species.

Leave all carcasses where found, unless a specimen is needed. Surveyors carry plastic bags and rubber gloves for bringing back specimens. They can then be placed in the freezer, and local experts can help identify them. A camera is required on all beach carcass surveys. It will prove valuable in developing a photographic key to identification for RNSP. This key, when refined, can than be carried by surveyors as well. The best representative photos of the entire bird, close-ups of plumage, feet, and bill will be highly useful.

Most carcasses do not require notifying outside entities. However, if the carcass of a whale (any species), sea lion (any species), seal (any species), dolphin (any species), sea turtle, or sea otter is found, contact Humboldt State University (HSU) Vertebrate Museum at 826-4872. They may want to add the specimen to their collection.

LITERATURE CITED

Ainley, D.G., R.E. Jones, R. Stallcup, D.J. Long, G.W. Page, L.T. Jones, L.E. Stenzel, R.L. LeValley, and L.B. Spear. 1994. Beached Marine Birds and Mammals of the North American West Coast. National Oceanic and Atmospheric Administration. San Francisco, CA. 236 pp.

Meehan, B.T. 1997. Warmer Pacific Delivers Ominous Signs of Change. Portland Oregonian. July 1 Issue.

Piatt, J.F., H.R. Carter, and D.N. Nettleship. 1991. Effects of Oil Pollution on Marine Bird Populations. In: The Effects of Oil on Wildlife-Research, Rehabilitation, and General Concerns. Conference Proceedings: The Oil Symposium. Herndon, VA. October 16-18, 1990. Sheridan Press, Hanover, PA. 210 pp.

Redwood National and State Parks. 1997. Snowy Plover Survey Protocol. Unpubl. Report

Appendix C. Beached carcass survey form (revised March 2001)

BEACH CARCASS SURVEY FORM **PG_____OF_____**

OBSERVERS_____ DATE_____ REACH # AND NAME_____

START TIME_____ END TIME _____ TIDE (HIGH)_____ TIDE (LOW)_____ INCOMING (Y/N)_____

IF NO CARCASSES FOUND, CHECK HERE_____

Species	Notes	Cond	Sex	Age	Photo	Oil	Oil-X	Oil-W	SC	D	GPS#

Species-ABBR. E.G., COMMON MURRE=COMU
NOTES-ENTIRE BIRD; WINGS &KEEL; ETC.
COND-2 (FRESH DEAD); **3** (DECOMPOSING); **4** (DRIED, MUMMIFIED); **5** (UNKNOWN)
SEX-F; M; U (UNKNOWN)
AGE-HY (HATCH YEAR); **JUV** (JUVENILE); **AD** (ADULT); **NH** (NEWLY HATCHED/EGG); **U** (UNKNOWN)
PHOTO-Y; N
OILED-Y; N; U (UNKNOWN)
OIL-X (EXTENT)-**1** (small globules, <2% OF BODY); **2** (2-33% OF BODY); **3** (34-66% OF BODY); **4** (67-100% OF BODY)
OIL-W (WHERE)-**1** (DORSAL ONLY); **2** (VENTRAL ONLY); **3** (ENTIRE BODY); **4** (HEAD ONLY); **5** (FEET ONLY); **6** (WINGS ONLY); **7** (OTHER)
SC (SCAVENGED)-**Y; N; U** (UNKNOWN)
D (CAUSE OF DEATH)-**1** (SHOT); **2** (TANGLED IN FISHING NET/LINE); **3** (TANGLED IN PLASTIC); **4** (UNK); **5** (OTHER)